THE EMOTIONAL CONTAGION SCALE: A MEASURE OF INDIVIDUAL DIFFERENCES

R. William Doherty

ABSTRACT: Three studies (N = 1988) describe the development and validation of the Emotional Contagion (EC) Scale, a 15-item unidimensional measure of susceptibility to others' emotions resulting from afferent feedback generated by mimicry. Study 1 assesses the EC Scale's reliability (Cronbach's α = .90). Study 2 finds susceptibility (a) positively related to reactivity, emotionality, sensitivity to others, social functioning, self-esteem, and more associated with emotional than cognitive modes of empathy, (b) negatively related to alienation, self-assertiveness, and emotional stability and, (c) unrelated to masculinity and approval motivation. Study 3, an experiment, finds that EC Scale scores reliably predict biases in participants' evaluations and are correlated with a measure of responsiveness to afferent feedback and self-reports of emotional experience following exposure to emotional expressions.

It has long been noted that emotions appear to be contagious (Darwin, 1872/1965; Jung, 1968; Reik, 1948). Some theorists have attributed the phenomenon to occult processes, projection and fantasy (Deutch & Madle, 1975), and learning (Aronfreed, 1970; Klinnert, Campos, Sorce, Emde, & Sveida, 1983). Others have proposed self-perception processes wherein individuals infer their emotional state from their own emotional expressions and behaviors and from the expressions and behaviors of others (Adelman & Zajonc, 1989; Bem, 1972; Laird, 1974, 1984; Laird & Bresler, 1990).

Hatfield, Cacioppo, and Rapson (1992, 1994) have argued that the process of emotional contagion is much too automatic, fast and fleeting, and too ubiquitous to be accounted for by such cognitive, associative, or self-perception processes. Hatfield and her colleagues have proposed that, as people attend to others, they continuously and nonconsciously mimic the other's fleeting emotional expressions and synchronize their facial, vocal, postural, and instrumental expressions with those to whom they are attending. The afferent feedback generated by this mimicry produces a si-

Address correspondence to R. William Doherty, Department of Psychology, University of Hawaii, Manoa, 2430 Campus Road, Honolulu, HI 96822.

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multaneous congruent emotional experience. Hatfield and her colleagues have termed this process "emotional contagion" and define it as "a tendency to automatically mimic and synchronize expressions, vocalizations, postures, and movements with those of another person's and, consequently, to converge emotionally" (1994, p. 5). Although there is accumulating support for Hatfield and her colleagues' theory, gathered from a wide range of participants and settings (for a review see Hatfield et al., 1994), until now there has been no reliable measure of individual differences in susceptibility to emotional contagion (i.e., the likelihood of "catching" the emotions of others).

Emotional Contagion and Empathy

To date, most theorists have considered congruent reactions of one individual to the observed emotional experiences of another as the result of empathic processes (Davis, 1983; Eisenberg & Miller, 1987). There is general agreement that empathy consists of both cognitive (Dymond, 1949) and more primitive emotional components (Davis, 1980; Mehrabian & Epstein, 1972). Cognitive models propose that people listen to another's description of his/her emotional experience and remember similar experiences and feelings and this conscious re-experiencing generates a similar emotional response (Deutch & Madle, 1975; Lang, 1985). The capacity for "the imaginative transposing of oneself into the thinking, feeling, and acting of another" (Allport, 1937/1961, p. 536) requires sufficient cognitive development to differentiate the psychological attributes of oneself and others and the ability to assume the psychological role of another (Eisenberg & Miller, 1987; Feshbach, 1978). Hatfield et al. (1992, 1994) draw a sharp distinction between these sophisticated cognitive forms of empathy and the primitive, basic process of emotional contagion and provide abundant evidence that even neonates appear to feel what others are feeling and to respond in a congruent manner (e.g., Hoffman, 1987; Thompson, 1987). They have turned their attention to the affective component of empathy and the role of elementary motor mimicry and afferent feedback in generating vicarious emotional experiences.

Mimicry and Afferent Feedback

The tendency to mimic the expressions of others does not appear to be learned (Lipps, 1906), is first apparent in neonates (Haviland & Lelwica,

1987; Meltzoff & Moore, 1977), and generally occurs without deliberate or conscious processing (O'Toole & Dubin, 1968). This elementary motor mimicry (Bavelas, Black, Lemery, & Mullett, 1987; Bernieri, Resnick, & Rosenthal, 1988; Condon & Sander, 1974), in which the observer automatically imitates facial, postural, vocal, and instrumental behaviors of another with slight movements which create inner cues that play a role in establishing emotional synchrony and contribute, through afferent feedback (Cacioppo, Martzke, Petty, & Tassinary, 1988; Strack, Martin, & Stepper, 1988), to understanding and experiencing the other's affect (Allport, 1937/1961).

Facial-feedback theory proposes that emotional experience is affected by changes in the skeletal musculature and that evolution has endowed humans with facial expressions that provide different patterns of sensory feedback of muscle tension levels to the brain, thereby evoking different emotions (James, 1890; Tomkins, 1963). There is abundant evidence that different emotions are, in fact, associated with different patterns of facial muscle activity (Adelman & Zajonc, 1989; Cacioppo et al., 1988; Dimberg, 1982; Duclos et al., 1989). Recent evidence that sensory neurons convey information directly from facial muscles to the hypothalamus led Zajonc (1980) to suggest that emotional experience may follow facial expressions rather than precede them. Although different emotions are associated with different patterns of facial muscle activity and the face plays an important role in the experience of emotions, emotions are not solely, or even primarily, generated by facial, postural, or vocal feedback. However, to the degree that emotions are influenced by these sources of feedback, spontaneous mimicry should contribute to emotional contagion.

Susceptibility to Emotional Contagion

Genetics, gender, early experience, and personality characteristics should contribute to individual differences in susceptibility to emotional contagion. Elements of temperament such as approach or withdrawal tendencies, distractibility and attention span, and threshold and intensity of responsiveness should all influence susceptibility. People who are more affected by high-intensity emotional reactions would be especially prone to vicarious emotional responding (Eisenberg et al., 1991). According to Hatfield et al. (1992, 1994), people especially susceptible are those who (a) pay close attention to others and are able to read others' emotional expressions, (b) construe themselves as interrelated with others rather than independent and unique, (c) tend to mimic facial, vocal, and postural expressions,

and (d) whose conscious emotional experience is powerfully influenced by peripheral feedback.

To summarize, the perception of an emotional expression can cause the viewer to mimic elements of that expression and, consequently, to experience the associated feeling state. Emotional contagion is a multiply determined family of psychophysiological, cognitive, behavioral, and social phenomena in which eliciting stimuli arise from one individual, act upon one or more others, and produce emotional responses that are congruent (e.g., smiling response to smiles) or complementary (e.g., withdrawal from a threatened blow) to the eliciting stimuli. Responses may include experiential, physiological, and/or behavioral changes characteristic of the emotional expression being mimicked. Susceptibility to emotional contagion may, therefore, be measured as the frequency with which emotional stimuli elicit an emotional expression characteristic of the eliciting emotion. The emotional response may be expressed cognitively (experiential states, appraisals, appreciations, fantasy, and perspective-taking), physiologically (neurophysiological arousal and patterned ANS activity), and behaviorally (expressive and instrumental behaviors).

Study 1

Overview, Samples, and Procedure

The goal of this study was to develop a short, reliable, unidimensional measure of individual differences in susceptibility to emotional contagion (EC). Although some of the items are more relevant to modern, developed cultural contexts, the emotions measured are basic, cross-culturally universal discrete action and expression systems (Ekman, 1992; Ekman, Friesen, & Ellsworth, 1982). A one-factor solution was expected to provide the best fit for the data and the most unambiguous interpretation of the summated score on the scale. However, because the scale measures reactions to both positive and negative emotions and people may respond differently as a function of emotional valence (Watson, Clark, & Tellegen, 1988), factor analysis of EC Scale items might suggest a multidimensional solution. As long as a one-factor solution is defensible (i.e., high factor loadings and high internal consistency) it is preferable on the basis of parsimony (McCroskey & Young, 1979).

Development of the EC Scale was conducted in three stages. In the first stage, items were designed to assess the consistency of congruent responses to five basic emotions: happiness, love, fear, anger, and sadness

(Fischer, Shaver, & Carnochan, 1990), and items assessing attention to the emotions of others. To avoid an acquiescence bias (Cronbach, 1960), items used positively- and negatively-worded statements with a four-point Likert scale response format (*Never, Rarely, Often,* and *Always*) to present an event in which (a) another's emotional experience/expression is present and (b) a congruent emotionally expressive response to the event follows.

In the first stage, items were administered to three subsamples: 543 students (290 men and 253 women) at the University of Hawai'i, with a mean age of 22.83 (SD = 4.77); 85 physicians (61 men and 24 women) with a mean age of 40.67 (SD = 12.76), from hospitals on the island of Oahu; 255 U.S. Marines (71 women and 184 men) with a mean age of 24.63 (SD = 5.20). Combining the three subsamples provided a large and diverse sample (N = 883; 535 men and 348 women) with age ranging from 17 to 80 (M = 25.09, SD = 8.01). Analysis of the internal consistency of the three items from each basic emotion category and the items assessing attention to others with the highest item-total correlations produced a moderately reliable 18-item instrument (α = .77). In the second stage, new items were developed. To reduce ambiguity, only positively-worded items were used [social desirability effects were assessed with the Marlowe-Crowne Social Desirability (MCSD) Scale (Crowne & Marlowe, 1964)]. Items were administered to 510 students (242 men and 268 women) at the University of Hawai'i, Manoa. The best 18 items still resulted in only moderated reliability (α = .82). For the third stage, the results of which are reported below, a fifth response option was added (*Never, Rarely, Usually, Often,* and *Always*) and the EC Scale's relationship to a number of psychological constructs was assessed.

Method

Participants and Procedure

Participants were 226 students (69 men and 157 women) at the University of Hawai'i, Manoa, and Maui Community College (MCC). The mean age was 24.87 (SD = 6.75) and the sample was culturally diverse. Participants completed questionnaires during class time following standardized instructions. Retest reliability was assessed with 43 MCC participants after a three-week interval. Participants received extra-credit points in psychology courses.

TABLE 1

The Emotional Contagion (EC) Scale

1 If someone I'm talking with begins to cry, I get teary-eyed.
2 Being with a happy person picks me up when I'm feeling down.
3 When someone smiles warmly at me, I smile back and feel warm inside.
4 I get filled with sorrow when people talk about the death of their loved ones.
5 I clench my jaws and my shoulders get tight when I see the angry faces on the news.
6 When I look into the eyes of the one I love, my mind is filled with thoughts of romance.
7 It irritates me to be around angry people.
8 Watching the fearful faces of victims on the news makes me try to imagine how they might be feeling.
9 I melt when the one I love holds me close.
10 I tense when overhearing an angry quarrel.
11 Being around happy people fills my mind with happy thoughts.
12 I sense my body responding when the one I love touches me.
13 I notice myself getting tense when I'm around people who are stressed out.
14 I cry at sad movies.
15 Listening to the shrill screams of a terrified child in a dentist's waiting room makes me feel nervous.

Note. Happiness items = 2, 3, & 11; Love items = 6, 9, & 12; Fear items = 8, 13, & 15; Anger items = 5, 7, & 10; Sadness items = 1, 4, & 14.

Results

Internal Consistency

After inspecting item-total correlations, the three "attention" items were dropped, leaving 15 highly intercorrelated items (see Table 1). Deleting these items and adding a midpoint response option substantially improved reliability (Cronbach's $\alpha = .90$). Principal components analysis indicated a unidimensional measure with factor loadings ranging from .46 to .69 (see Table 2). Although a single-factor solution best fit the data, several solutions were examined and two sets of intercorrelated items were found:

TABLE 2

EC Scale Internal Consistency and Item Means

Emotion	Item	r^{ab}	Factor Loading	Mean[c]	SD
Love	6	.66	.67	3.79	1.00
Love	9	.52	.53	3.94	.99
Love	12	.44	.46	4.24	.81
Happiness	2	.47	.49	3.99	.80
Happiness	3	.53	.56	4.09	.84
Happiness	11	.65	.68	3.86	.90
Fear	8	.59	.59	3.45	.99
Fear	13	.68	.69	3.20	1.26
Fear	15	.53	.49	3.18	1.20
Anger	5	.48	.48	2.65	1.06
Anger	7	.53	.53	3.62	1.05
Anger	10	.62	.62	3.59	1.08
Sadness	1	.64	.62	3.19	1.14
Sadness	4	.54	.53	3.73	1.07
Sadness	14	.58	.53	3.47	1.21

Note. [a]$N = 226$. [b]Item-total correlation. [c]$N = 369$.

a positive subscale consisting of the love and happiness items and a negative subscale consisting of the fear, anger, and sadness items (Cronbach's $\alpha = .82$ and .80, respectively). Retesting after a 3-week interval found Time 1 and Time 2 scores to be reliably correlated, $r(41) = .84$, $p < .001$. The mean difference from Time 1 to Time 2 was .06 on a 5–point scale, $t = 1.45$, $p = .15$.

Study 2

To assess the EC Scale's construct validity, the relationship between emotional contagion and potentially related constructs was examined. To the extent that the EC Scale is related to measures to which it should logically be related, and to the extent that it displays no relationship to measures to which it should not logically be related, support for the EC Scale's validity will be increased (Campbell & Fiske, 1959). It would be expected that increased sensitivity to the emotional experience of others would improve

social functioning, and thus have a positive effect on self-esteem. People with higher self-esteem would be less likely to be anxious in the presence of others and less likely to withdraw from social interaction (this might not be the case for people more susceptible to the negative emotions of others). People who are more sensitive to the emotional expressions of others would likely be more empathic than less sensitive people but they might also be more emotionally unstable. It was, therefore, predicted that susceptibility would be positively related to reactivity, emotionality, sensitivity to others, social functioning, self-esteem, and empathy. Also, susceptibility should be more strongly related to emotional empathy than to cognitive modes of empathy such as perspective-taking and fantasy. It was also predicted that susceptibility would be negatively related to emotional stability, alienation, and masculinity, and unrelated to approval motivation. Finally, because the process of emotional contagion involves attention to both internal and external cues and may tap some motivation to regulate levels of arousal, measures of introversion-extraversion and psychoticism were collected with no predictions made.

Method

Participants and Procedure

Participants were 369 students (106 men and 263 women) at the University of Hawai'i, Manoa, and MCC. The mean age was 26.11 (SD = 8.44) and, as in the previous study, the sample was culturally diverse. Participants completed packets of questionnaires during class time following standardized instructions and received extra-credit points in psychology courses.

Measures

Social desirability. The Marlowe-Crowne Social Desirability (MCSD) Scale (Crowne & Marlowe, 1964) was completed by 85 participants (41 men and 44 women). The MCSD was used to screen EC Scale items for social desirability effects and to assess a motivation for approval and impression management.

Reactivity. Eighty participants (20 men and 60 women) completed Hatfield and Sprecher's (1986) Passionate Love Scale (PLS), Scheier and Carver's (1985) Revised Self-Consciousness Scale (SCS), and Cheek and Buss' (1981) 13-item Revised Shyness Scale (SS). The PLS measures arousal

cognitively, emotionally, and behaviorally. The SCS and SS measure behavioral inhibition and subjective discomfort in the presence of others.

Emotionality. The same 80 participants completed Booth-Butterfields' (1990) Affective Orientation (AO) Scale and the Masculinity-Femininity (M-F) Scale of Spence and Helmreich's (1978) 24-item Personal Attributes Questionnaire (PAQ). The AO is a unidimensional measure of the tendency to be aware of one's own feelings and use such emotional cues as information. The M-F Scale assesses masculinity-femininity in terms of respondents' self-perceived possession of personality traits stereotypically believed to differentiate the sexes and considered more socially desirable for one sex than for the other (high scores denote more masculine traits).

Sensitivity to others. These 80 participants also completed the Masculinity (M) Scale and the Femininity (F) Scale of the 24-item PAQ. Both scales present personality traits stereotypically believed to differentiate the sexes but considered desirable in both sexes. The F Scale assesses sensitivity to others' feelings and emotive, interpersonally-oriented traits; the M Scale assesses a lack of sensitivity and self-controlled, instrumental, and self-assertive traits. Another 131 participants (33 men and 98 women) completed Eysencks' (1975) Psychoticism (P) and Extraversion-Introversion (E) Scales of the Eysenck Personality Questionnaire (EPQ). The P Scale assesses egocentrism, insensitivity to others, and a lack of empathy. Extraversion is associated with excitability, an orientation toward external reality, and sensitivity to social stimulation; Introversion is associated with reactivity, loneliness, and social withdrawal.

Emotional stability. The same 131 participants completed the EPQ's Neuroticism (N) Scale, a measure of emotional instability, irritability, anxiety, and reactivity.

Social functioning. Rosenberg's (1965) Self-Esteem Scale (SES) and Jessers' (1977) Alienation Scale (AS) were administered to 136 participants (61 men and 75 women). The SES is a unidimensional measure of global feelings of self-worth and self-acceptance positively associated with popularity and social confidence and negatively related to anxiety, depression, and alienation. The AS measures generalized alienation, uncertainty about the meaningfulness of daily roles and activities, and a belief that one is isolated from others.

Empathy. These same 80 participants completed Mehrabian and Epstein's (1972) Measure of Empathic Tendency (MET) and 119 participants

(30 men and 89 women) completed Davis' (1980) Interpersonal Reactivity Index (IRI). The MET assesses the tendency to respond emotionally to others' feelings whereas the IRI uses two subscales each to tap emotional (empathic concern and personal distress) and cognitive (perspective-taking and fantasy) modes of responding.

Results

EC Scale and Item Means

The mean EC Scale score (see Table 2), found by averaging across the sum of all 15 items, was 3.62 (SD = .54). Scores were higher for the positive subscale (M = 3.99, SD = .59) than the negative subscale (M = 3.37, SD = .63), $t(368) = 24.85$, $p < .001$. Women were more susceptible to emotional contagion than men (Ms = 3.72 and 3.36, SDs = .54 and .52, respectively), $t(37) = 62.06$, $p < .001$. Following a significant multivariate effect for gender on positive and negative subscale means, $F(2, 368) = 30.51$, $p = < .001$, women were found more susceptible than men to others' positive (Ms = 4.02 and 3.89, SDs = .55 and .67, respectively), $F(1, 367) = 3.72$, $p = .05$, and negative emotional expressions (Ms = 3.52 and 3.01, SDs = .57 and .63, respectively), $F(1, 367) = 56.56$, $p < .001$.

Table 3 displays the correlations between the EC Scale and comparison measures. Not every respondent completed every measure and these data do not constitute a complete matrix. Correlations for the combined sample, before and after controlling for gender effects, and for men and women separately are listed.

The relationships between the EC Scale and the comparison measures were as predicted. Susceptibility was unrelated to approval motivation. Susceptibility was positively related to reactivity: those more susceptible are more likely to love passionately and feel shy and self-conscious. Correlations between EC Scale scores and selected items on the SCS indicate that those more susceptible to emotional contagion are especially likely to embarrass easily (SCS item 3), $r(78) = .25$, $p = .02$, and feel anxious in front of large groups (SCS item 6), $r(78) = .32$, $p = .005$. A strong relationship was also found between negative subscale and SS scores, $r(78) = .35$, $p = .004$, indicating that those more susceptible to others' negative emotional expressions are more likely to be shy and withdrawn. Susceptibility was positively related to emotionality, the use of affective cues as information, and sensitivity (femininity), but unrelated to insensitivity (masculinity). Although no linear relationship was found between susceptibility and psy-

TABLE 3

Relationships Between the EC Scale and Comparison Psychological Measures

Measure	*N*	*r*[a]	*pr*[b]	Women	Men
Measure of approval motivation					
Marlowe-Crowne Social Desirability Scale	85	−.04	−.02	.00	−.05
Measures of reactivity					
Passionate Love Scale	80	.24	.29	.21	.56
Self-Consciousness Scale	80	.33	.31	.32	.31
Shyness Scale	80	.22	.20	.21	.20
Measures of emotionality					
Affective Orientation Scale	80	.29	.27	.20	.46
Masculinity-Femininity Scale	80	−.39	−.29	−.20	−.49
Measures of sensitivity to others					
Femininity Scale	80	.42	.38	.37	.39
Masculinity Scale	80	−.10	−.01	−.02	−.08
Measure of emotional stability					
Neuroticism Scale	131	−.30	−.29	−.30	−.37
Measures of social functioning					
Self-Esteem Scale	136	.38	.36	.48	.26
Alienation Scale	136	−.38	−.30	−.51	−.15
Measures of empathy					
Measure of Empathic Tendency (ET)	80	.47	.37	.21	.68
ET Positive Subscale	80	.43	.38	.28	.65
ET Negative Subscale	80	.43	.34	.19	.68
Interpersonal Reactivity Index (IRI)					
Perspective-taking Subscale	119	.14	.09	−.07	.39
IRI Fantasy Subscale	119	.19	.19	.18	.24
IRI Empathic Concern Subscale	119	.37	.35	.28	.50
IRI Personal Distress Subscale	119	.31	.27	.24	.35

Note. Underlined values are non-significant ($p > .05$). [a]Correlation between measures. [b]Correlation after partialling out the contribution of gender.

choticism, $r(129) = -.01$, $p > .05$, there was evidence of a systematic relationship after segmenting P Scale scores at the 48th and 71st percentiles. Scores on the P Scale ranged from 22 to 39 ($M = 27$, $SD = 2.78$); in the lower segment ($N = 63$) scores ranged from 22 to 26 ($M = 25.06$, $SD = .88$); between the 49th and 70th percentiles ($N = 37$) scores ranged from 27 to 28 ($M = 27.35$, $SD = .48$); in the upper segment ($N = 31$) scores ranged from 29 to 39 ($M = 31.07$, $SD = 2.54$). In the lower segment, P Scale and EC Scale scores were positively correlated, $r(61) = .27$, $p = .03$, unrelated in the middle segment, and negatively correlated in the upper segment, $r(31) = -.33$ ($p = .05$). There was also no relationship between susceptibility and introversion/extraversion, in general, $r(129) = -.02$, $p > .05$, but there was between the positive subscale and E Scale scores, $r(126) = -.31$, $p > .001$, and between the negative subscale and E Scale scores, $r(126) = .21$, $p = .02$, indicating that those who are more introverted are more affected by others' positive emotional expressions; those who are more extraverted are more affected by others' negative expressions. Comparisons with the N Scale indicate that those whose emotions are more influenced by others' emotional expressions are, as would be expected, more emotionally unstable. In terms of social functioning, susceptibility was positively related to self-esteem and popularity and negatively related to alienation and a feeling of being isolated. As predicted, susceptibility was associated more with emotional than cognitive modes of empathic responding and more with the tendency to respond to others' negative emotional experiences with feelings of warmth, compassion, and concern than with discomfort and anxiety.

Study 3

If the EC Scale is a valid measure of the tendency to mimic others' emotional expressions and responsiveness to afferent feedback, it should correlate with other measures of mimetic tendency and responsiveness to afferent feedback. It should also predict emotional behavior, both expressive and instrumental, following exposure to others' emotional expressions.

The EC Scale, Judges' Ratings, and Participants' Self-reports of Emotional Contagion

In Doherty et al. (1995), participants were videotaped while watching videotapes of emotionally expressive stimulus persons relating their happiest and saddest memories. Two indices of emotional contagion were con-

structed using the Borg Scale, which allows the ratio measurement of categorical data related to subjective experience of intensity (for information on the reliability and validity of this scale see Borg, 1982). The judges' Emotional Contagion Index (ECI) was the judges' ratings of participants' facial expressions for how much happiness or sadness the participants expressed; the participants' ECI was the participants' ratings of how happy and sad they felt while watching the stimulus person. Participants also completed the earlier 18-item version of the EC Scale using a four-point Likert scale. Theoretically, EC Scale scores, judges' ECI scores, and participants' ECI scores all measured susceptibility to emotional contagion and significant correlations were found between scores on the EC Scale and judges' ECI, $r(186) = .26$, $p < .001$, and participants' ECI, $r(186) = .45$, $p < .001$. There was only a weak relationship between judges' ECI and participants' ECI scores, $r(186) = .17$, $p > .05$. The relationship between EC Scale scores and participants' ECI scores held for both men, $r(61) = .34$, $p < .001$, and women, $r(123) = .39$, $p < .001$, but again, there was no correlation between participants' and judges' ECI scores. In all comparisons the EC Scale was a better predictor of emotional contagion than judges' ratings of participants' expressions (for a full discussion see Doherty et al., 1995).

Cue-Responsiveness and Susceptibility to Emotional Contagion

Hatfield et al. (1992, 1994) proposed that people whose subjective emotional experience is influenced by facial, vocal, postural, and movement feedback should be more susceptible to emotional contagion. Similarly, self-perception theorists have long proposed that we infer our emotional state by observing our expressive behavior and the context in which it occurs (Bem, 1972; James, 1890) and that individual differences in the effects of cues generated by expressive behavior and cues that arise from the situation influence subjective emotional experience (Laird, 1974; Laird & Bresler, 1990). Laird et al. (1994) recently found that individual differences in responsiveness to cues generated by emotional expression do, in fact, influence susceptibility, and people who report feeling the emotion that corresponds to their own behavior are also more likely to feel the emotions of others they mimic. Thus, both the EC Scale and Laird's measure of cue-responsiveness (CR) are predictors of emotional arousal resulting from facial expressions, even expressions resulting from mimicry. A positive correlation between scores on these two measures would support the EC Scale's construct validity. A comparison of these two measures as predictors of emotional behavior following exposure to another's emo-

tional expressions and a positive correlation between EC Scale scores and participants' self-reported moods following exposure to another's emotional expressions would provide evidence of the EC Scale's predictive validity.

To test these relationships, a less subjective indicator of emotional arousal than second-order facial expressions (i.e., those resulting from mimicry), which are often barely perceptible and difficult to rate, was selected. It is consistently found (Bower, 1991; Bower, Gilligan, & Monteiro, 1981; Forgas, 1991; Forgas & Bower, 1987; Isen, 1987; Isen & Shalker, 1982) that people's evaluations of other people, objects, events, and interpersonal situations are biased by their emotional state in a mood-congruent manner: people in positive and negative moods tend to make more positive and negative evaluations, respectively. On the basis of Hatfield and her colleagues' (1992, 1994) model in which people catch the emotions of others as the result of afferent feedback generated by mimicking others' emotional expressions, it would be expected that, following exposure to an emotionally expressive stimulus person, participants would exhibit a bias in their evaluations characteristic of the mood of the person to whom they were exposed. It was hypothesized here that both the EC Scale and Laird's measure of cue-responsiveness (CR) would reliably predict biases in participants' evaluations following exposure to a mildly happy or sad stimulus person. It was also hypothesized that EC Scale scores, CR scores, and participants' self-reports of their moods following exposure would be positively correlated.

Method

Participants

Seventy-four students (49 women and 25 men) at the University of Hawai'i, Manoa, participated. The mean age was 24.71 (SD = 5.34) and the sample was culturally diverse. Participants received extra credit units in psychology courses.

Materials

Stimulus tapes. To provide the stimulus for the mood manipulation, three videotapes were prepared using the same woman as the "sender" of the emotional message. The intent was to present expressions of happiness and sadness that (a) were within the normal range of social intercourse and, (b) still clearly differed from a neutral mood. Similar to Bower et al.

(1983), the mood of the stimulus person was manipulated using imagination guided by hypnotic suggestions. Prior to being hypnotized, the stimulus person was videotaped reciting a scripted message which presented a fictive explanation of the study and instructions for performing the experimental tasks on a computer. The instructions were sufficiently detailed to keep the attention of the participants on the sender but were not complicated. The sender was videotaped reciting the script again after being made sad and, again, after being made happy. The three tapes were identical in terms of lighting, sound, and message content and differed only in terms of the emotionally expressive behavior of the stimulus person and the length of the tape. The differences in tape lengths (happy = 2:50 min; neutral = 3:05 min; sad = 3:55 min) reflect the speech characteristics associated with sadness and happiness (Hatfield, Costello, Schalenkamp, Hsee, & Denney, 1991; Scherer, 1982). The tapes were rated by 14 independent judges, blind to the purpose of the tapes, using the Borg Scale (1982) in response to two questions: (1) "How happy was the person in the video feeling?" and, (2) "How sad was the person in the video feeling?" Response options ranged from "Not at all" to "Extremely" (values range form zero to 11). Judges' scores were found by subtracting the score on the sadness question from the score on the happiness question [possible range = −11 (extremely sad) to +11 (extremely happy)]. The judges rated the stimulus person in the happy tape happier ($M = 3.45$, $SD = 2.43$) than in the neutral tape ($M = -1.01$, $SD = 2.06$), $t(13) = 5.61$, $p = .001$, and sadder in the sad tape ($M = -3.79$, $SD = 1.31$) than in the neutral tape, $t(13) = 3.43$, $p = .005$. A score of 3 on the Borg Scale represents a "Moderate" amount of emotion. The Spearman-Brown coefficient of interrater reliability for the ratings was .83.

Procedure

Participants were recruited for a "cross-cultural study of aesthetic judgment" one month prior to the experiment. At recruitment, participants completed a packet of questionnaires including the EC Scale. This was a mixed design and participants came to the lab twice with a three-week interval between visits. On the first visit, participants viewed the emotionally neutral stimulus tape and then rated 10 photographs from the cross-cultural photo journal, *The Family of Man* (Steichen, 1955). The photos had been previously rated for emotional content (see Doherty, 1995, for a full discussion of the rating process). The pictures were presented in counterbalanced sets on a computer and all ratings were made by clicking along a 15 cm graphic scale beneath each photo. The scale was labeled

"Extremely Negative" at one end and "Extremely Positive" at the other. No numeric values were shown (values ranged from −10 to +10). The final measure taken at the first visit, was the measure of cue-responsiveness (CR) developed by Laird et al. (1994). This measure was taken last to avoid effects of the expression manipulation influencing ratings or response latencies.

At the second visit, participants were randomly assigned to video condition. Unlike the first visit wherein all participants viewed the videotape of the stimulus person in a neutral mood, participants assigned to the negative video condition viewed the videotape in which the stimulus person was sad; participants assigned to the positive video condition viewed the videotape in which the stimulus person was happy. After viewing the stimulus tapes, participants again rated the same 10 photos. For the manipulation check, participants recorded the extent to which they felt happy or sad while watching the stimulus person (see below).

Cue-Responsiveness (CR) Measure

Participants were presented with five graphic scales labeled either "Happy," "Disgusted," "Angry," "Afraid," or "Sad" on the computer. Scales were labeled "Felt nothing at all" at one end and "Felt a great deal" at the other. No numeric values were shown (values ranged from zero to 10). Following the protocol developed by Laird et al. (1994), participants were first asked "to adopt their own natural smiles of happiness" (p. 236), maintain them for 10 s, and then indicate how they felt while smiling, recording how positive they felt by clicking along the happy scale and how negative they felt by clicking along either the anger, fear, disgust, or sadness scale. Next, participants were asked to adopt their own natural frowns of sadness and maintain them for 10 s and indicate how positive and negative they felt while frowning. Participants' negative scores while smiling were subtracted from their positive scores while smiling (CR positive) and their positive scores while frowning were subtracted from their negative scores while frowning (CR negative). The CR positive and CR negative scores were then summed to form a CR total score (values ranged from −20 to +20) and then dichotomized at the median to form a categorical variable (CR) dividing participants into groups of high and low responsiveness to self-produced cues. Although CR total indicates the extent to which participants were affected by their expressions, Laird et al. (1994) dichotomize these scores to avoid problems of skew and variance due to individual differences in arousal. Scores are typically skewed because participants are more likely to report high positive scores than high negative scores. Also,

responsiveness to self-produced cues, the underlying construct, is influenced by (a) the extent to which participants actually do attend to self-produced cues and, (b) participants' levels of autonomic arousal. Cues from autonomic arousal contribute to the intensity of the experience. Thus, two participants who were equally responsive to self-produced cues but who differed in their levels of arousal would produce very different expression effect difference scores because the more aroused participant's emotions would swing more widely between trials to produce a bigger difference score.

Participants' Mood Scores

To assess the effectiveness of the stimulus tapes in manipulating participants' moods, participants were asked "How much, if any, personal reactions of happiness or sadness were you feeling while watching the videotape?" Responses were made by clicking along a pair of graphic scales, one labeled "Happiness," the other "Sadness," and both of which were labeled "Feeling none at all" at one end and "Feeling a great deal" at the other (values ranged from zero to 10). Participants' mood scores were found by converting emotionally incongruous responses (i.e., sadness after viewing the happy stimulus person or happiness after viewing the sad stimulus person) to negative values (values range from -10 to $+10$). The mood score, a measure of the effectiveness of the mood manipulation, was used as an indicator of susceptibility to the emotional expressions of others: those more susceptible would be expected to report an emotional experience similar to that of the stimulus person.

Results

Prior to comparing the EC Scale and Laird's cue-responsiveness (CR) measure it was necessary to determine that (a) exposure to different emotional expressions resulted in biased evaluations characteristic of the mood of the stimulus person, and (b) that CR scores reliably predicted observed biases. A 2 (condition) $\times$ 2 (video condition) $\times$ 2 (CR) mixed analysis of variance was conducted on pre-test and post-test scores with video condition (sad vs. happy) and CR (low vs. high) as between-subjects factors and condition as the within-subjects factor. Participants' averaged ratings of the photographs following exposure to the neutral stimulus person represent control condition, or pre-test, scores; their ratings following exposure to either the happy or sad stimulus person represent treatment condition, or post-test,

scores. As expected, ratings reflected biases characteristic of the stimulus person's mood: participants in the sad video condition rated the photographs more negatively ($M = -1.97$, $SD = .99$) than those in the happy video condition ($M = -1.15$, $SD = .70$), $F(1, 70) = 7.18$, $p = .009$. Although the between-subjects effect of CR was slightly less than reliable ($p = .07$), a significant three-way within-subjects interaction (Condition × Video Condition × CR) was found, $F(1, 70) = 4.98$, $p = .03$, in which, compared to their control condition ratings, high CR participants in the sad video condition rated the photographs more negatively (pre- and post-test means = −1.58 and −2.19, *SD*s = 1.30 and 1.01, respectively) while high CR participants in the happy video condition rated the photographs more positively (pre- and post-test means = −1.69 and −1.36, *SD*s = .81 and .53, respectively). To better understand the influence of cue-responsiveness on changes in participants' performance, a difference score indicating both the size and direction of change was found by subtracting pre-test scores from post-test scores. A 2 (video condition) × 2 (CR) analysis of variance on the difference scores found a significant Video Condition × CR interaction, $F(1, 70) = 4.32$, $p = .04$. Scores for low CR participants showed the smallest and least systematic change (sad and happy video condition means = −.20 and −.24, *SD*s = .85 and .89, respectively); high CR participants showed the greatest and most systematic change (sad and happy video condition means = −.53 and .33, *SD*s = 1.24 and .77, respectively) and post hoc tests (Tukey HSD) confirmed that these differences were significant ($p = .04$). The next step was to substitute EC Scale scores for the CR scores and replicate the analysis of the dependent measures. A general linear model mixed analysis of the main and crossed effects of condition, video condition, and EC Scale scores again found a significant three-way within-subjects interaction (Condition × Video Condition × EC Scale scores), $F(1, 70) = 9.04$, $p = .004$, and inspection of the regression coefficients indicated that the EC Scale performed in a manner very similar to Laird's measure of cue-responsiveness: compared to their control condition ratings, more susceptible participants in the sad video condition rated the photographs more negatively, $F(1, 32) = 5.43$, $p = .03$ ($\beta = -.33$) while more susceptible participants in the happy video condition rated the photographs slightly more positively, $F(1, 38) = 1.10$, $p > .05$ ($\beta = .16$). Finally, in testing the predicted relationships between EC Scale scores, CR scores and participants' mood scores, it was first determined that mood scores were, in fact, influenced by exposure to expressions of sadness and happiness: participants' mood scores were lower in the sad video condition ($M = 2.49$, $SD = 2.67$) than in the happy video condition ($M = 3.98$, $SD = 3.53$), $t(73) = 4.77$, $p < .001$. As